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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Office Action Summary	Application No. 10/736,818	Applicant(s) WU ET AL.	
	Examiner Luis F. Garcia	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claim 1, 8, 15, 18 and 22 have been considered but are moot in view of the new ground(s) of rejection in which Scobey discloses the concept of "hitless" switching in col12 ln21-43 as defined by applicant's specification pg3 ln6-9.

Claim Objections

2. Claim 15 is objected to because of the following informalities: "light beam that is projected at a cross junction" should be changed to "light beam that is projected <u>from</u> a cross junction" and "light beam projected at the cross junction" should be changed to "light beam projected <u>from</u> the cross junction". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **<u>Claims 8-11 and 13-14 are rejected</u>** under 35 U.S.C. 102(b) as being anticipated by Liou (US 6,292,299).

<u>Regarding claim 8</u>, Liou discloses a reconfigurable device, comprising:

an input port for receiving a light signal **(FIG. 3 (350-collimator, 355-fiber))**; and

a thin film filter having a first face and a second face **(FIG. 3 (100-wavelength tunable filter, 110-wavelength-tunable filter) and col2 ln49-66, col3 ln29-36 in**

which the tunable wavelength tunable filter (thin film filter) has a first face (e.g. left side of 100, facing collimators 350,370) and a second face (e.g. right side of 100, facing collimator 260). NOTE: Liou discloses that the wavelength tunable filter is a thin film interference filter-col2 ln62-66), the first face of the thin film filter having an upper surface area and a lower surface area **(FIG. 3 in which the thin film filter has an upper surface area (e.g. 110) and a lower surface area (120))**, wherein the upper surface area is thin film coated for passing through a wavelength of the light signal **(FIG. 3 in which the upper surface area (e.g. 110) is thin film coated (e.g. col2 ln62-66) for passing through a wavelength of the light signal, e.g. col3 ln66-67 to col4 ln1-4 in which the filter region-110 passes through a single wavelength channel)** and the lower surface area is coated with a reflective material for blocking and reflecting the light signal **(FIG. 3 (120-reflective region) and col3 ln6-27 in which the lower surface is coated with a reflective material (e.g. metallic coating or dielectric reflector) for blocking and reflecting the light signal)**, wherein the coating of the reflective material has a thickness that allows for hitless switching of the wavelength of the light signal **(col3 ln6-28 and col12 ln1-20 in which a "thin" single layer of gold is formed as shown in FIG. 9D; therefore, the gold layer inherently has a thickness in order to allow for hitless switching-Abstract)**.

Regarding claim 9, Liou discloses the reconfigurable device of claim 8 as applied above.

Liou further discloses comprising a dual fiber collimator coupled between the input port and the thin film filter **(FIG. 3 (collimators-350,370) in which a dual fiber**

collimator (e.g. 350,370) is coupled between the input port (e.g. 355) and the thin film filter (e.g. 110)), the dual fiber collimator coupled to the input port for receiving the light signal and having a reflection port for receiving the reflected light signal **(FIG. 3 in which the dual fiber collimator (e.g. 350,370) is coupled to the input port (e.g. 355) for receiving the light signal and has a reflection port (e.g. 370) for receiving the reflected light signal)**.

Regarding claim 10, Liou disclose the reconfigurable device of claim 9 as applied above.

Liou further discloses comprising a single fiber collimator for receiving the wavelength of light signal from the thin film filter **(FIG. 3 (360-collimator) in which the single fiber collimator receives the wavelength of light from the thin film filter)** and transmitting the light signal to a transmission output port **(FIG. 3 in which the collimator-360 transmits the light signal to a transmission output port-365)**.

Regarding claim 11, Liou further discloses the reconfigurable device of claim 8 as applied above.

Liou further discloses wherein the reflective material of the lower surface area in the first face of the thin film filter comprises gold **(col3 ln6-10 in which the reflective material comprises gold)**.

Regarding claim 13, Liou discloses the reconfigurable device of claim 8 as applied above.

Liou further discloses comprising a mechanical relay for moving the thin film filter to a first position for passing through the wavelength of light signal through the upper

surface area in the first face of the thin film filter **(FIG. 3 (XZ-filter positioner) and FIG. 1 (points-1,4) in which the positioner (a mechanical relay) moves the thin film filter to a first position (points-1 or 4) for passing through the wavelength of light through filter region-110 (upper surface area in the first face of the thin film filter))**.

Regarding claim 14, Liou discloses the reconfigurable device of claim 8 as applied above.

Liou further discloses comprising a mechanical relay for moving the thin film filter to a second position such that the light signal is reflected back from the lower surface area of the first face in the thin film filter **(FIG. 3 (XZ-filter positioner) and FIG. 1 (points-2 or 3) in which the XZ positioner (mechanical relay) moves the thin film filter to a second position (e.g. point-2) such that the signal is reflected back from the reflective region-120 (lower surface area of the first face in the thin film filter))**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 15 and 18-22 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Scobey (US 6,320,996).

Regarding claim 15, Scobey discloses a hitless thin film filter; comprising:

a thin film filter having a first face and a second face, the first face having an upper surface and a lower surface **(FIG. 8 (22-optical switch, 62-first surface, 64-second surface) in which the switch (thin film filter) has a first face (e.g. 64) and a second face (e.g. 62) and the second surface has an upper surface area and a lower surface area)**; and

a reflective material coated onto the lower surface of the first face in the thin film filter, wherein the reflective material has a thickness t in which the thickness t affects the intensity of a light beam that is projected at a cross junction of the thin film filter, the cross junction of the thin film filter being located between the upper surface and the lower surface **(col12 ln21-43 in which the thickness of the reflective region effects the intensity of the reflected signal, e.g. added reflective coatings (increased thickness) reduce destructive interference (affects the light intensity) at the cross junction/translation between regions (FIG. 8: between 70 and 68))**.

Scobey does not expressly disclose wherein the thickness t is selected so that the intensity of the light beam that is projected at the cross junction of the thin film filter is at a maximum.

However, Scobey clearly discloses in col12 ln21-43 that the in order to reduce destructive interference (e.g. project a maximum intensity) during the translation between stages (at the cross junction), extra coating layers are added to allow for phase matching between the two stages, e.g. a thickness is selected to phase match the optical signal at the cross junction. Therefore, it would have been obvious to one of ordinary skill in the art that by reducing the destructive interference of the optical signal

at the cross junction will in turn maximize the intensity of the signal projected from the crossjunction. The motivation being that without phase matching, interference will reduce the intensity of certain express channels (projected channels) which reduces the effectiveness of the optical switch as expressly disclosed by Scobey col12 ln32-34. Therefore, selecting an appropriate thickness by adding coating layers will reduce destructive interference at the cross junction which in turn maximizes the intensity of the reflected/projected optical signal.

Regarding claim 18, Scobey discloses a reconfigurable add-drop optical system, comprising:

a first thin film filter chip having a first face and a second face **(col4 ln36-61 and FIG. 21 (621a-first switch), FIG. 1 (10-second switch), FIG. 2 (third switch) in which the first switch (e.g first thin film filter chip) has a first face and a second face (e.g. FIG. 8, 22-switch with a first (64) and a second face (62))**, wherein the first face of the first thin film filter chip is partially coated with a thin film to transmit a specific wavelength of a light signal **(FIG. 8 (64-second surface) in which the first face (e.g. second surface) is partially coated with a thin film selective filter in order to transmit a specific wavelength of a light signal, e.g. (1) FIG. 3 in which only λ_4 (specific wavelength) is transmitted through the optical switch-22; (2) FIG. 17 in which only λ_6 (specific wavelength) is transmitted through the optical switch-22)** and is partially coated with a reflective material to a thickness that allows the specific wavelength of the light signal to undergo hitless switching **(FIG. 8 (64-second surface, 70 reflective coating) and col12 ln21-43 in which the first face (e.g second**

surface) is partially coated with a reflective material, allowing the specific wavelength to be reflected, e.g. FIG. 2 in which the reflective material of the optical switch-22 allows the specific wavelength (e.g. λ4) of the light signal to be reflected. NOTE: col12 ln21-43 the phase of the optical signal, at the crossjunction of the reflective and wavelength selective regions, are designed to match; thereby, preventing destructive interference at the cross section, e.g. allows for hitless switching of λ_4 when transitioning in between stage A (FIG. 2) and stage B (FIG. 3)); and

a second thin film chip, coupled to the first thin film chip, having a first face and a second face **(FIG. 21 (621a-first switch), FIG. 1 (10-second switch), FIG. 2 (third switch) in which the second switch (e.g second thin film filter chip) coupled to the first thin film chip and has a first face and a second face (e.g. FIG. 8, 22-switch with a first (64) and a second face (62))**, wherein the first face of the second thin film filter chip is partially coated with a thin film and partially coated with a reflective material **(FIG. 8 (64-second surface, 70 reflective coating) in which the first face (e.g second surface) is partially coated with a reflective material)**.

Scobey does not expressly disclose the term "hitless" switching. However, as defined by applicant in the specification pg 3 ln6-9:

"The term "hitless" in this context means that there is no interruption or negligible interruption in the passage of express or non-drop channels when another channel is transitioning from drop to non-drop or non-drop or drop"

Scobey does in fact disclose the concept of "hitless" switching. Scobey discloses in col12 ln21-43 that the in order to reduce destructive interference (e.g. project a maximum intensity) during the translation between stages (at the cross junction), extra coating layers are added to allow for phase matching between the two stages, e.g. a thickness is selected to phase match the optical signals at the cross junction. Therefore, it would have been obvious to one of ordinary skill in the art that by reducing the destructive interference of the optical signal at the cross junction will in turn allow for no interruption or negligible interruption in the passage of express channels when transitioning from drop to non-drop or vice-verse, e.g. transitioning from Stage A (FIG. 2) to Stage B (FIG. 3). The motivation being that without phase matching, interference will reduce the intensity of certain express channels (interrupt certain express channels) which reduces the effectiveness of the optical switch as expressly disclosed by Scobey col12 ln32-34. Therefore, selecting an appropriate thickness by adding coating layers will reduce destructive interference at the cross junction which will allow the crossjunction to have no interruption or negligible interruption on the express channels.

Regarding claim 19, Scobey discloses the reconfigurable add-drop optical system of claim 18 as applied above.

Scobey further discloses comprising a third thin film chip, coupled to the second thin film chip, having a first face and a second face **(FIG. 21 (621a-first switch), FIG. 1 (10-second switch), FIG. 2 (third switch) in which the third switch (e.g third thin film filter chip) coupled to the second thin film chip and has a first face and a second face (e.g. FIG. 8, 22-optical switch with a first (64) and a second face (62)),**

wherein the first face of the third thin film filter chip is partially coated with a thin film and partially coated with a reflective material **(FIG. 8 (64-third surface, 70 reflective coating) in which the first face (e.g second surface) is partially coated with a reflective material).**

Regarding claim 20, Scobey discloses the reconfigurable add-drop optical system of claim 18 as applied above.

Scobey further discloses comprising:

a dual fiber collimator coupled to the first thin film chip, the dual fiber collimator having an input port and a reflection output port **(FIG. 21 (610-optical switch) in which the optical switch contains a dual fiber collimator coupled to the first thin film chip (e.g. 662a) having an input port and a reflection output port)**; and

a single fiber collimator coupled to the first thin film chip, the single fiber collimator having a transmission output port **(FIG. 21 (610-opical switch) in which the single fiber collimator coupled to the first thin film chip is a transmission output (e.g. outputs λ_0))**.

Regarding claim 21, Scobey discloses the reconfigurable add-drop optical system of claim 18 as applied above.

Scobey further discloses comprising:

a first dual fiber collimator coupled to the first thing film chip, the dual fiber collimator having an input port and an output reflection/add port **(FIG. 19 (20a-collimator) in which the dual fiber collimator has an input port (e.g. 12a) and an output reflection port (e.g. 12b))**; and

a second dual fiber collimator coupled to the first thin film chip, the single fiber collimator having a transmission output port and an input add port **(FIG. 19 (20c-collimator) in which the second dual fiber collimator coupled the first thin film chip (e.g. 22) has an output port (e.g 12d) and an add port (e.g. 12c))**.

<u>Regarding claim 22</u>, Scobey discloses a reconfigurable thin-film-filter-based dense wavelength division multiplexing (DWDM) device, comprising:

a first dual fiber collimator having an input port for receiving an input optical signal and a output reflection/add port **(FIG. 19 (20a-collimator) in which the dual fiber collimator has an input port (e.g. 12a) and an output reflection port (e.g. 12b))**;

a second dual collimator having an output transmission port and an input add port **(FIG. 19 (20c-collimator) in which the second dual fiber collimator coupled the first thin film chip (e.g. 22) has an output port (e.g 12d) and an add port (e.g. 12c))**; and

a hitless thin film filter located between the first dual fiber collimator and the second dual fiber collimator **(col4 ln36-61 and FIG. 19 (22-optical switch) in which the optical switch (thin film filter) is located between the first dual fiber collimator and the second dual fiber collimator)**, the thin film filter having a first face and a second face **(FIG. 8, 22-switch with a first (64) and a second face (62))**, the first face of the thin film filter having an upper one-half and a lower one-half, the lower one-half of the first face in the thin film filter being coated with a reflective material **(FIG. 8 (64-second surface, 70 reflective coating) in which the first face (e.g second surface)**

has an upper and lower half, with the lower one-half being partially coated with a reflective material).

Scobey does not expressly disclose a "hitless" thin film filter. However, as defined by applicant in the specification pg 3 ln6-9:

"The term "hitless" in this context means that there is no interruption or negligible interruption in the passage of express or non-drop channels when another channel is transitioning from drop to non-drop or non-drop or drop"

Scobey does in fact disclose the concept of a "hitless" thin film filter/optical switch. Scobey discloses in col12 ln21-43 that the in order to reduce destructive interference (e.g. project a maximum intensity) during the translation between stages (at the cross junction), extra coating layers are added to the optical switch element (thin film filter) to allow for phase matching between the two stages, e.g. a thickness is selected to phase match the optical signals at the cross junction. Therefore, it would have been obvious to one of ordinary skill in the art that by reducing the destructive interference of the optical signal at the cross junction will in turn allow for no interruption or negligible interruption in the passage of express channels when transitioning from drop to non-drop or vice-verse, e.g. transitioning from Stage A (FIG. 2) to Stage B (FIG. 3). The motivation being that <u>without phase matching, interference will reduce the intensity of certain express channels</u> (interrupt certain express channels) which reduces the effectiveness of the optical switch as expressly disclosed by Scobey col12 ln32-34. Therefore, selecting an appropriate thickness by adding coating layers creates a "hitless" thin film filter that reduces the destructive interference at the cross junction

which enables the crossjunction to have no interruption or negligible interruption on the express channels.

5. **Claims 1-7 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Scobey in view of Baumeister et al (US 5,333,090), Baumeister et al hereinafter referred to as Baumeister.

Regarding claim 1, Scobey discloses a reconfigurable thin-film-based dense wavelength division multiplexing (DWDM) device, comprising:

a dual fiber collimator having an input port for receiving an input optical signal and a reflection output port **(FIG. 19 (20a- dual fiber collimator) in which the dual fiber collimators has an input port (e.g. 12a) and a reflection output port (e.g. 12b))**;

a single fiber collimator having a transmission output port **(FIG. 2 (20c-single fiber collimator) in which the single fiber collimator has a transmission output port (e.g. 20c))**; and

a thin film filter located between the dual fiber collimator and the single fiber collimator **(FIG. 19 (22-optical switch), FIG. 2 (22-optical switch), FIG. 14 (22-optical switch) and col4 ln38-50 in which the switch contains a thin film interference filter, located between the dual fiber collimator and the single fiber collimator)**, the thin film filter having a first face and a second face **(FIG. 14 (22-optical switch) and FIG. 8 (22-optical switch, 62-first surface, 64-second surface) in which the switch (thin film filter) has a first and second surface (face))**, the first face of the thin film filter having an upper one-half and a lower one-half **(FIG. 14 (22-optical switch) and**

FIG. 8 (22-optical switch, 64-second face) in which the second surface (first face) has an upper one-half and lower one-half), the upper one-half of the first face of the thin film having a thin film coating that allows a specific wavelength of the input optical signal to pass through **(FIG. 8 (68-wavelength selective filter) in which the upper half of the first face (e.g. 68) has a thin film coating that allows a specific wavelength of the input optical signal to pass, e.g. FGI. 17 in which optical switch (22), shown in more detail in FIG. 14, allows only λ_6 to pass through)** and the lower one-half of the first face in the thin film filter being coated with a reflective material that reflects the input optical signal **(FIG. 8 (70-reflective coating) in which the lower one-half of the second surface (first face) is coated with a reflective material (e.g. reflective coating))**,

Scobey does not expressly disclose wherein the reflective coating has a thickness that is an integer multiple of the specific wavelength of the input optical signal.

Baumeister teaches wherein the reflective coating (e.g. coated mutli-layer stack-col4 ln35-39) has a thickness that is an integer multiple of the specific wavelength of the input optical signal **(FIG. 4 and col4 ln35-39,col5 ln39-42 in which the thickness of the coated multi-layer stack is an integer multiple of the specific wavelength of the input optical signal, e.g. thickness=(2N-1)/8*λ_l where N is a positive integer and λ_l is the incident long wavelength (specific wavelength of input optical signal))**.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Scobey and incorporate Baumeister's teachings of wavelength

dependent dielectric thickness. The motivation being that this allows the designers to optimize the wavelength reflectivity of the coated multi-layer stack based on thickness of the stack as taught by Baumeister FIG. 5 (Loss = 1-Reflectivity) and col6 ln22-54; thereby, reducing loss at the operating wavelength(s).

Regarding claim 2, Scobey in view of Baumeister disclose the DWDM device of claim 1 as applied above.

Scobey further discloses wherein the thin film filter has a first position such that the specific wavelength of the input optical signal travels through the dual fiber collimator **(FIG. 17 (20a-collimator) in which the optical switch (thin film filter) has a first position such that the specific wavelength (e.g. λ_6) of the input optical signal travels through the dual fiber collimator)**, the upper one-half of the first face in the thin film filter **(FIG. 17 in which the specific wavelength passes through the upper one-half of the first face of the optical switch)**, and the single collimator in generating an output optical signal at the transmission output port **(FIG. 17 (20c-colliamator) in which the single collimator (e.g. 20c) generates an output signal at the output port (e.g. fiber-16c))**.

Regarding claim 3, Scobey in view of Baumeister disclose the DWDM device of Claim 2 as applied above.

Scobey further discloses wherein the thin film filter has a second position such that the input optical signal travels through the dual fiber collimator, projects into the lower one-half of the first face in the thin film filter having the reflective material, thereby the input optical signal is reflected back through the dual fiber collimator to the reflection

output port **(FIG. 14 (22-optical switch, positions A,B), FIG. 2 (position A), FIG. 3 (position B) in which the A position the input optical signal travels through the dual fiber collimator, projects into the lower one-half of the first face having the reflective material, thereby being reflected back through the dual fiber collimator to the reflection output port (e.g. FIGs. 2,14 (12b))**.

Regarding claim 4, Scobey in view of Baumeister the DWDM device of claim 2 as applied above.

Scobey further discloses comprising a mechanical relay for moving the thin film filter to the first position **(FIG. 4 (80-electromechanical actuator, positions A,B) in which the actuator moves the thin film filter to a first position (e.g. A position))**.

Regarding claim 5, Scobey in view of Baumeister disclose the DWDM device of claim 3 as applied above.

Scobey further discloses comprising a mechanical relay for moving the thin film filter to the second position **(FIG. 4 (80-electromechanical actuator, positions A,B) in which the actuator moves the filter to a second position (e.g. B position))**.

Regarding claim 6, Scobey in view of Baumeister disclose the DWDM device of claim 1 as applied above.

Scobey further discloses wherein the reflective material of the lower one-half in the first face of the thin film filter comprises gold **(col11 ln31-41 in which the reflective region/material comprises a reflective gold layer)**.

Regarding claim 7, Scobey in view of Baumeister disclose the DWDM device of claim 1 as applied above.

Scobey further discloses wherein the reflective material of the lower one-half in the first face of the thin film filter is coated with a metal or an oxide **(col11 ln31-41 in which the reflective region/material comprises a reflective gold layer (metal coating))**.

6. **Claims 1-2, 12 and 15 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Liou (US 6,292,299) in view of Baumeister.

Regarding claim 1, Liou discloses a reconfigurable thin-film-based dense wavelength division multiplexing (DWDM) device, comprising:

a dual fiber collimator having an input port for receiving an input optical signal and a reflection output port **(FIG. 3 (fibers-355,375 and collimators-350,370) in which the dual fiber collimator (e.g. 350,355,370,375) has an input port (e.g. 355,350) for receiving an input signal and a reflection output port (e.g. 370,375))**;

a single fiber collimator having a transmission output port **(FIG. 3 (collimator-360,fiber-365) in which a single fiber collimator (e.g. 360) is the transmission output port, e.g. outputs to fiber-365)**; and

a thin film filter located between the dual fiber collimator and the single fiber collimator **(FIG. 3 (100-wavelength tunable filter, 110-wavelength-tunable filter) and col2 ln49-66, col3 ln29-36 in which a wavelength-tunable filter is located between the first dual fiber collimator and the single fiber collimator. NOTE: Liou discloses that the wavelength tunable filter is a thin film interference filter-col2 ln62-66)**, the thin film filter having a first face and a second face **(FIG. 3 in which the tunable wavelength tunable filter (thin film filter) has a first face (e.g. left side of 100,**

facing collimators 350,370) and a second face (e.g. right side of 100, facing collimator 260)), the first face of the thin film filter having an upper one-half and a lower one-half **(FIG. 3 in which the first face of the wavelength tunable filter (thin film filter) has an upper one-half (e.g. 110-tunable filter region) and a lower one-half (e.g. 120-reflective region))**, the upper one-half of the first face of the thin film having a thin film coating that allows a specific wavelength of the input optical signal to pass through **(FIG. 3 (110-wavelength tunable filter) and col3 ln66-67 to col4 ln1-10 in which a single wavelength is dropped from an incident optical signal containing p wavelengths, e.g. (p-1) wavelengths are reflected while a specific wavelength is transmitted through the filter region-110)** and the lower one-half of the first face in the thin film filter being coated with a reflective material that reflects the input optical signal **(FIG. 3 (100-hitless wavelength tunable filter) in which the lower one-half of the first face is coated with a reflective material (e.g. col3 ln6-28-reflective metallic coating such as gold, silver or a dielectric broadband reflector))**,

Liou does not expressly disclose wherein the reflective coating has a thickness that is an integer multiple of the specific wavelength of the input optical signal.

Baumeister teaches wherein the reflective coating (e.g. coated mutli-layer stack-col4 ln35-39) has a thickness that is an integer multiple of the specific wavelength of the input optical signal **(FIG. 4 and col4 ln35-39,col5 ln39-42 in which the thickness of the coated multi-layer stack is an integer multiple of the specific wavelength of the input optical signal, e.g. thickness=(2N-1)/8*λ_i where N is a positive integer**

and λ_l is the incident long wavelength (specific wavelength of input optical signal)).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Liou and incorporate Baumeister's teachings of wavelength dependent dielectric thickness. The motivation being that this allows the designers to optimize the wavelength reflectivity of the coated multi-layer stack based on thickness of the stack as taught by Baumeister FIG. 5 (Loss = 1-Reflectivity) and col6 ln22-54; thereby, reducing loss at operating wavelength(s).

Regarding claim 2, Liou in view of Baumeister disclose the DWDM device of claim 1 as applied above.

Liou further discloses wherein the thin film filter has a first position such that the specific wavelength of the input optical signal travels through the dual fiber collimator **(FIG. 3 in which the input optical signal including a specific wavelength pass through one side of the dual fiber collimator (e.g. 350,355,370,375))**; the upper one-half of the first face in the thin film filter **(FIG. 3 and col3 ln66-67 to col1-4 in which the specific wavelength (e.g. dropped single wavelength channel) pass through the upper one half of the hitless tunable optical filter-100)**, and the single collimator in generating an output optical signal at the transmission output port **(FIG. 3 (360-collimator) in which the single wavelength channel is dropped through the signal collimator port (e.g. 360)(generating an output optical signal at the transmission output port))**.

Regarding claim 12, Liou discloses the reconfigurable device of claim 8 as applied above.

Liou does not expressly disclose wherein the reflective material of the lower surface area in the first face of the thin film filter comprises a an oxide.

Baumeister teaches wherein the reflective material of the lower surface area in the first face of the thin film filter comprises an oxide **(col9 ln61-67 to col10 ln1-2 in which the coated reflective layer is aluminum oxide)**.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Liou and incorporate Baumeister's teachings of using an oxide for the reflective coating. The motivation being that this allows designers the freedom to choose the appropriate material such as aluminum oxide based on the material properties (e.g. transmissivity, reflectivity (1-transmissivity), optical thickness, refractive index, etc) as taught by Baumeister col9 ln61-67 to col7 ln1-2.

Regarding claim 15, Liou discloses a hitless thin film filter; comprising:

a thin film filter having a first face and a second face **(FIG. 3 in which the tunable wavelength tunable filter (thin film filter) has a first face (e.g. left side of 100, facing collimators 350,370) and a second face (e.g. right side of 100, facing collimator 260))**, the first face having an upper surface and a lower surface **(FIG. 3 in which the first face of the wavelength tunable filter (thin film filter) has an upper one-half (e.g. 110-tunable filter region) and a lower one-half (e.g. 120-reflective region))**; and

a reflective material coated onto the lower surface of the first face in the thin film filter **(FIG. 3 (100-hitless wavelength tunable filter) in which the lower one-half of the first face is coated with a reflective material (e.g. col3 ln6-28-reflective metallic coating such as gold, silver or a dielectric material))**,the cross junction of the thin film filter being located between the upper surface and the lower surface **(FIG. 1 in which the cross junction is located between the upper surface (e.g. 110) and the lower surface (e.g. 120), e.g. transition from matchpoint 1 to 2 passes over the crossjunction in which the part of the light signal that is incident on the reflective portion-120 is reflected back at an intensity that is inherently dependent on the properties of the reflective material such as type of material used (metal or dielectric), thickness, etc)**.

Liou does not expressly disclose wherein the reflective material has a thickness t in which the thickness t affects the intensity of a light beam that is projected at a cross junction of the thin film filter; wherein the thickness t is selected so that the intensity of the light beam that is projected at the cross junction of the thin film filter is at a maximum.

Baumeister teaches wherein the reflective material has a thickness t in which the thickness t affects the intensity of a light beam that is projected at a cross junction of the thin film filter **(FIG. 5 (LOSS vs Thickness) in which the thickness of the reflective material affects the intensity of a light beam that is projected from the reflective material)**; wherein the thickness t is selected so that the intensity of the light beam that is projected at the cross junction of the thin film filter is at a maximum **(FIG. 5 (LOSS vs**

Thickness) and col6 ln42-46 in which the thickness of the reflective material is selected so that the loss of the reflected input light beam is minimum (intensity of the light beam is maximum), e.g. selected thickness in the range of 0.05L to .0225L minimizes the loss (maximizes the intensity) of the reflected optical signal. NOTE: FIG. 5/col6 ln21-25: "loss" = 1-Reflectivity, e.g. lower the "loss", greater the reflectivity).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Liou and incorporate Baumeister's teachings. The motivation being that this allows for the thickness of the reflective coating to be selected in order to minimize signal loss, increase reflectivity/maximize the reflected signal; thereby, allowing the system to minimize losses and maximize performance.

7. **Claims 16 and 17 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Scobey in view of Lecture (Lecture 25, 30 November 1999).

Regarding claim 16, Scobey discloses the hitless thin film filter of Claim 15 as applied above.

Scobey further discloses the thin film filter to be an interference filter col4 ln38-61.

Scobey does not expressly disclose the equation governing an interference filter and wherein intensity of the light is governed by the following equation: $t(\sin\Phi) = n\lambda$ wherein the angle Φ denotes the incident angle of light, the symbol λ denotes a particular wavelength and the symbol n denotes an integer or fractional number.

Lecture teaches the equation governing a dielectric slab (thin film) interference filter and wherein intensity of the light is governed by the following equation: $t(\sin\Phi) = n\lambda$ wherein the angle Φ denotes the incident angle of light, the symbol λ denotes a particular wavelength and the symbol n denotes an integer or fractional number **(pg 3 equation: 25.5 in which the transmission of light is governed by equation: $m\lambda_m = 2d\cos\theta_t$ (m=0,1,2,...) where m corresponds to the peak intensity/order (pg3-adjustable by varying d, n, or θ_t), d corresponds to the dielectric medium thickness-pg2, θ_t-corresponds to the light signal incident angle and λ_m corresponds to the light wavelength. NOTE: the equation is also written as $t(\sin\Phi) = n\lambda$, in which $\Phi = \pi/2-\theta_t$, t=2d, n=m).**

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Scobey and incorporate Lecture's teachings. The motivation being that this allows one of ordinary skill in the art to design a thin film interference filter based on system constraints such as operating wavelength, operating incident angle, allowable material thickness, material properties-index of refraction, etc. Thereby, allowing the system designer to construct a filter that will work properly with the system.

Regarding claim 17, Scobey in view of Lecture disclose the hitless thin film filter of claim 16 as applied above.

Lecture further disclose if n=0,1,2,... I=Imax=Io **(pg 3 in which the peak intensity (Imax) occur at m=0,1,2).**

If n=1/2 I=Imin=0 **(FIG. 25.2 and pg3 in which the derived equation is based on a plane-parallel dielectric slab which creates symmetrical fringes (e.g. maxima**

occur at multiples of 2πm with m=0,1,2,..., pg3); therefore, the minima must occur symmetrically in between the maxima (e.g. multiples of π or π m with m=1/2, 11/2,...)).

8. **Claim 22 is rejected** under 35 U.S.C. 103(a) as being unpatentable over Liou in view of Liou in view of Scobey.

Regarding claim 22, Liou discloses a reconfigurable thin-film-filter-based dense wavelength division multiplexing (DWDM) device, comprising:

a first dual fiber collimator having an input port for receiving an input optical signal and a output reflection/add port **(FIG. 3 (collimators-350,370) in the collimators and input/output fibers have an input port (e.g. elements-350,355) and an output reflection port (e.g. 370-375))**;

a second dual collimator having an output transmission port and an input add port **(FIG. 3 (collimator-360) and co3 ln66-67 to col4 ln1-10 in which a second collimator has a port which functions as an add or drop (output) port)**; and

a hitless thin film filter located between the first dual fiber collimator and the second dual fiber collimator **(FIG. 3 (100-hitless wavelength tunable filter, 110-wavelength-tunable filter) and col2 ln49-66, col3 ln29-36 in which a hitless wavelength-tunable filter is located between the first dual fiber collimator and the second fiber collimator. NOTE: Liou discloses that the tunable filter is a thin film interference filter-col2 ln62-66)**, the thin film filter having a first face and a second face **(FIG. 3 in which the tunable wavelength tunable filter (thin film filter) has a first face (e.g. left side of 100, facing collimators 350,370) and a second face (e.g. right**

side of 100, facing collimator 260)), the first face of the thin film filter having an upper one-half and a lower one-half **(FIG. 3 in which the first face of the wavelength tunable filter (thin film filter) has an upper one-half (e.g. 110-tunable filter region) and a lower one-half (e.g. 120-reflective region)),** the lower one-half of the first face in the thin film filter being coated with a reflective material **(FIG. 3 (120-reflective region) in which the reflective region is coated with a reflective material-col3 ln6-28).**

Liou does not expressly disclose a second dual collimator having an output transmission port and an input add port.

Scobey teaches a second dual collimator having an output transmission port and an input add port **((FIG. 19 (20c-collimator) in which the second dual fiber collimator (e.g. 12c,12d,20c), coupled to the first thin film chip (e.g. 22), has an output port (e.g 12d) and an add port (e.g. 12c))).**

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Liou and incorporate Scobey's teachings of separate add/drop ports. The motivation being that this simplifies the configuration of Liou's add/drop port, e.g. to add/drop via the same fiber requires (1) the transmitter and receiver to be moved and realigned to the single fiber to perform either adding or dropping functions or (2) two separate ports-one with a transmitter "hardwired" to the add port and one with a receiver "hardwired" to the drop port. In which the second configuration (Scobey's teachings) is simpler to implement and more cost effect (e.g. not alignment mechanism need).

Therefore, the use of two separate ports, one for adding and one for dropping wavelengths simplifies the configuration and implementation of an add/drop device.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luis F. Garcia whose telephone number is (571)272-7975. The examiner can normally be reached on 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken N. Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LG

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER